

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY.'S DOCKET: JACQUINOT=7

In re Application of:	)	Art Unit: 1765
	)	
Eric JACQUINOT et al	)	Examiner: D. Deo
	)	
Appln. No.: 09/427,675	)	Washington, D.C.
	)	
Date Filed: October 27, 1999	)	Confirmation No. 3607
	)	
For: NEW ABRASIVE COMPOSITION	)	July 14, 2003
FOR THE INTEGRATED...	)	

**REPLY: REQUEST FOR RECONSIDERATION AND ENTRY OF  
DECLARATION UNDER 37 CFR 1.132**

Honorable Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This is in Reply to the final Action mailed January 15, 2003, Paper No. 23. Attached hereto are (1) a petition for three months' extension of time and payment of the three months' late fee, and (2) a Declaration under 37 CFR 1.132 in the name of Dr. Jacquinot.

The final Office Action has been carefully reviewed. The claims in the application remain as claims 17-40. Applicants again submit that these claims define patentable subject matter over any known prior art, and applicants therefore again respectfully request favorable reconsideration

and allowance, as well as entry of the attached Declaration under Rule 132.

Claims 17-40 have been rejected again as obvious under §103 from Jacquinet '159 in view of Grover. This rejection is again respectfully traversed.

Jacquinet discloses a method of chemical mechanical polishing of electric isolation material using an acid aqueous suspension of colloidal silica containing individualized colloidal silica particles, not linked together by siloxane bonds, and water as the suspension medium. Abrasion is carried out by rubbing the layer in question using a fabric which has been impregnated with the acid aqueous suspension of colloidal silica.

Consistent with the process of the present invention, the particle size of the silica particles is in Jacquinet between 3 and 250 nm, preferably between 3 and 150 nm, and most preferably between 10 and 50 nm.

In addition, the pH is between 1 and 6, preferably between 1.5 and 4 and most preferably between 2 and 3.

However, no mention is made in Jacquinet of the polishing of materials formed of one layer of silicon oxide and another layer of silicon nitride, in which the problems exist which necessitated the present invention.

Very importantly, and as acknowledged by the PTO, Jacquinet does not disclose or suggest the presence of the surfactant in the liquid abrasive composition which is impregnated into the fabric used for rubbing the surface to be polished.

Unlike Jacquinet, Grover is concerned with the same or similar problems faced by the present applicants. As stated in the first paragraph near the top of column 1, Grover indicates that the invention disclosed therein concerns a chemical mechanical polishing (CMP) slurry having "a unique chemistry that is especially suitable for chemical mechanical planarization where a high silicon dioxide removal rate, and a low silicon nitride removal rate are required on the same substrate." Compare the background section of Grover with the background section of the present application, and also please note the objectives set forth in Grover at column 2, lines 22-31, especially the third such statement as follows:

..., this invention is a method using a chemical mechanical polishing composition that selectively removes silicon dioxide from a substrate while leaving a silicon nitride layer associated with the substrate essentially intact.

In this regard, the objective and teaching of Grover is to provide a CMP slurry that has a greater than a 5 to 1 oxide to nitride selectivity (column 2, line 8-10).

To accomplish its objectives, Grover teaches a method for using a chemical mechanical polishing composition comprising carboxylic acid, a salt and a soluble cerium compound in an aqueous solution having a pH from about 3.0 to about 11, preferably from about 3.8 to about 5.5 (column 6, lines 31-34), to selectively remove silicon oxide overfill in preference to a silicon nitride film layer (column 2, lines 47-50).

The chemical mechanical polishing composition may be used alone or it may be combined with a metal oxide abrasive to form a slurry (column 2, lines 61-63). The optional metal oxide (which may or may not be added to the CMP composition) may be selected from the group including alumina, titania, zirconia, germania, silica, ceria and mixtures thereof (column 4, lines 22-24).

In preferred embodiments of Grover in which an abrasive slurry is added to the composition, pulverized cerium oxide (column 4, lines 46-54), precipitated cerium oxide (column 5, lines 3-10) or fumed silica (column 5, lines 11-25) are mentioned as metal oxide abrasives. Discrete metal oxide particles having a particle diameter less than 500 nm are cited (column 5, lines 56-59), but there is no working example and no details are given about the type of discrete particles.

Grover also discloses the optional use of surfactants (column 6, lines 37-64). However, surfactants are only one variety of additional optional additives. Further, the function of the optional surfactant is stated to be to improve stability of the polishing slurry, i.e. against settling, flocculation and decomposition of the oxidizing agent (column 6, lines 37-39) or to improve steric stabilization of the slurry (column 6, lines 49-54). Moreover, addition of a surfactant may improve the within-wafer-non-uniformity (WIWNU) of the wafers. However, not a single one of the 34 slurries of Grover shows the use of a surfactant in the slurry.

The rejection, penultimate paragraph on page 4, states that "applicant has not traversed the fact that a surfactant is added [in Grover] in order to improve stability of the slurry... as taught by Grover." However, applicants tests as revealed by the data set forth in Table 2 of the attached Declaration of Dr. Jacquinet reveal that the addition of surfactant does not improve stability of the Grover slurry. The person of ordinary skill in the art, desiring to follow the teachings of Grover, would test Grover compositions containing surfactant and not containing surfactant. Upon discovering that surfactant provides no advantage, the person of ordinary skill in the art would not add to the cost by

adding surfactant which does not improve stability.

Considering next the proposed combination, one must first ask what the person having ordinary skill in the art would do, faced with applicants' problem and reading Jacquinet and Grover together. As Grover seeks to solve the same problems (or similar problems) faced by the applicants, the person of ordinary skill in the art facing the same problems would be strongly guided by Grover, and less guided by Jacquinet. What then does Grover absolutely require in order to accomplish the objective of greater than a 5 to 1 oxide to nitride selectivity so as to selectively remove silicon dioxide while leaving silicon nitride essentially intact? The answer is clear! Grover absolutely requires (1) a carboxylic acid, (2) a salt, and (3) a soluble cerium compound<sup>1</sup>. The presence or absence of a surfactant is unimportant.

The person skilled in the art seeking to obtain the present results would have had no incentive to combine both references (Jacquinet and Grover).

To accomplish the desired objectives, the person of ordinary skill in the art is guided by Grover to use a polishing slurry which critically contains a carboxylic acid, a salt, and a soluble cerium compound, and it is stated at the

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<sup>1</sup> The pH is taught by Grover to be less important, as it may be anywhere between "about 3.0 to about 11" (column 2, line 35).

bottom of column 2 that such a composition has "been found to inhibit silicon nitride polishing". Therefore, these ingredients must be incorporated, and their inclusion is contrary to the present invention. In effect, applicants have flown in the face of Grover and have nevertheless surprisingly achieved success.

The Final Rejection states, to the contrary, "because an alternative way doesn't mean teaching away from the invention." Applicants do not understand the examiner's position in this regard. It is not proper to isolate one element from the teachings of a reference, but the reference in its entirety must be considered, noting for example *In re Mercier*, 185 USPQ 774, 778 (CCPA 1975), where the Court stated:

Whether appellant's invention is obvious under 35 USC 103 depends at the outset upon the propriety of the Board's simultaneous reliance on what Enk says is known in the art and disregard the rest of Enk's disclosures. We find several difficulties with this analysis. ... These and other questions arise because the Board's approach fails to recognize that **all** of the relevant teachings of the cited references must be considered in determining what they fairly teach to one having ordinary skill in the art. [citations omitted; emphasis of the Board]

The Court then continued further as follows:

The relevant portions of a reference include not only those teachings which would suggest particular aspects of an invention to one

having ordinary skill in the art, but also those teachings which would lead such a person away from the claimed invention. [citation omitted]

Also see *In re Wesslau*, 147 USPQ 391, 393 (CCPA 1965), where the Court stated:

It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.

Also see *In re Umbricht*, 160 USPQ 15, 19 (CCPA 1968) to the same effect.

Grover teaches those of ordinary skill in the art to proceed in a way which is **different** from and contrary to the present invention, and it therefore teaches away from the present invention for the reasons pointed out above.

Moreover, evidence is also present in Grover which additionally teaches away from the present invention, attention being invited to slurries 20 and 21 of Table 4, column 9 of Grover.

In these two examples, the quantity of Grover's critical components (in that example the percentage of ammonium cerium nitrate) was insignificant, but the slurry did contain 4% by weight of silica. The selectivity was very low, under 5. This evidence teaches away from following any teachings of Jacquinet, and thus teaches away from the



proposed combination and from the present invention. Certainly, there would have been no reasonable expectation of applicants' results from a consideration of slurries 20 and 21 in Table 4 of Grover, and it must be concluded that applicants' results are unobvious from the prior art.

Bearing in mind that the surfactant of Grover is optional, and is not used in any of the Grover slurry examples, and further in view of the fact that Grover makes no teaching whatsoever that such a surfactant has any ability to improve the oxide to nitride selectivity of a CMP slurry, and further bearing in mind that Grover teaches that other components are necessary to achieve such a result (which components are not used in and are contrary to the present invention), the addition of a surfactant not only would not have been *prima facie* obvious to the person of ordinary skill in the art in order to obtain the desired objective of increasing the oxide to nitride selectivity, but in addition there is not the remotest hint in the prior art that the addition of a surfactant would provide applicants' improved results.

To restate this latter point, the addition of a surfactant to the Jacquinet composition provides unexpected effects, i.e. the selective polishing of silicon oxide

relative to silicon nitride, which could not have been predicted or foreseen from the prior art.

To further support applicants' position of the unobviousness of the present invention, a number of tests were conducted under the supervision of Dr. Jacquinot, the first named inventor of the present invention and the first named inventor of the primary reference relied upon. Dr. Jacquinot is an expert in this art as is evidenced by his experience and the work he has produced in the present field. The test results as set forth in Tables 1 and 2 speak for themselves. However, one can summarize as follows:

1. Looking at Table 1 and comparing the present invention (slurries 2 and 3) with the closest prior art, i.e. Jacquinot (slurry 1), there is a surprisingly high increase in effectiveness by a factor of 119 in slurry 2 over slurry 1, and an increase by a factor of 49 of slurry 3 over slurry 1.

2. The present invention also provides substantial improvements over Grover, or even over Grover modified to make it more like the present invention.

3. With regard to stability as shown in Table 2, the Grover slurry 8 is unstable. The addition of surfactant does not improve its stability as noted from test 9.

4. Better selectivity results are obtained according to Grover at higher pH (slurry 8 compared with

slurry 6), consistent with what is disclosed in Grover. On the other hand, as noted above, when the pH of the Grover is increased, the slurry becomes unstable.

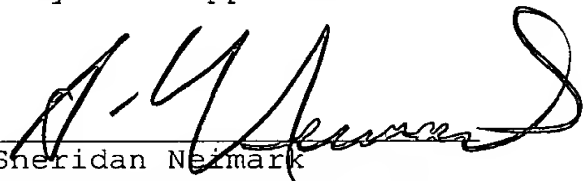
Applicants request the examiner to carefully review the attached Declaration, and to also consider the conclusions of Dr. Jacquinot commencing at the bottom of page 8 of the attached Declaration. Dr. Jacquinot's conclusions will not be here repeated, as they already appear in the declaration. These conclusions include statements of fact, which must be accepted. To the extent that they include opinions, it is noted that Dr. Jacquinot is an expert in this art and his expert opinion must also be given weight.

Applicants respectfully request withdrawal of the rejection and formal allowance.

Respectfully submitted,

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## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Application of: Eric JACQUINOT et al

Application No.: 09/427,675

Filed: October 27, 1999

For: NEW ABRASIVE COMPOSITION FOR THE INTEGRATED CIRCUITS...

Confirmation No.: 3607

Art Unit: 1765

Examiner: D. DEO

Washington, D.C.

Atty.'s Docket: JACQUINOT=7

Date: July 14, 2003

AF 1765  
RECEIVED  
JUL 17 2003  
TC 1700THE COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

Sir:

Transmitted herewith is a [X] Reply: Request For Reconsideration And Entry Of Declaration Under 37 CFR 1.132 in the above-identified application.

[ ] Small entity status of this application under 37 CFR 1.9 and 1.27 has been established by a verified statement previously submitted

[ ] A verified statement to establish small entity status under 37 CFR 1.9 and 1.27 is enclosed.

[ ] No additional fee is required.

The fee has been calculated as shown below:

(Col. 1)		(Col. 2)		(Col. 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA EQUALS	RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
TOTAL	* 23	MINUS	** 23	0	x 9	\$		x 18	\$
INDEP.	* 3	MINUS	*** 3	0	x 40	\$		x 80	\$
FIRST PRESENTATION OF MULTIPLE DEP. CLAIM					+ 135	\$		+ 270	\$
					ADDITIONAL FEE TOTAL	\$	OR	TOTAL	\$

\* If the entry in Col. 1 is less than the entry in Col. 2, write "0" in Col. 3.

\*\* If the "Highest Number Previously Paid for" IN THIS SPACE is less than 20, write "20" in this space.

\*\*\* If the "Highest Number Previously Paid for" IN THIS SPACE is less than 3, write "3" in this space.

The "Highest Number Previously Paid For" (total or independent) is the highest number found from the equivalent box in Col. 1 of a prior amendment of the number of claims originally filed.

[XX] Conditional Petition for Extension of Time

If any extension of time for a response is required, applicant requests that this be considered a petition therefor.

[XX] It is hereby petitioned for an extension of time in accordance with 37 CFR 1.136(a). The appropriate fee required by 37 CFR 1.17 is calculated as shown below:

## Small Entity

## Response Filed Within

[ ] First - \$ 55.00

[ ] Second - \$ 205.00

[ ] Third - \$ 465.00

[ ] Fourth - \$ 725.00

## Month After Time Period Set

## Other Than Small Entity

## Response Filed Within

[ ] First - \$ 110.00

[ ] Second - \$ 410.00

[XX] Third - \$ 930.00

[ ] Fourth - \$ 1450.00

## Month After Time Period Set

[ ] Less fees (\$ ) already paid for \_\_\_ month(s) extension of time on \_\_\_\_\_.

[ ] Please charge my Deposit Account No. 02-4035 in the amount of \$ \_\_\_\_\_.

[XX] Credit Card Payment Form, PTO-2038, is attached, authorizing payment in the amount of \$ 930.00 .

[ ] A check in the amount of \$ \_\_\_\_\_ is attached (check no. ).

[XX] The Commissioner is hereby authorized and requested to charge any additional fees which may be required in connection with this application or credit any overpayment to Deposit Account No. 02-4035. This authorization and request is not limited to payment of all fees associated with this communication, including any Extension of Time fee, not covered by check or specific authorization, but is also intended to include all fees for the presentation of extra claims under 37 CFR §1.16 and all patent processing fees under 37 CFR §1.17 throughout the prosecution of the case. This blanket authorization does not include patent issue fees under 37 CFR §1.18.

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